

Teaching and Learning with LUDII

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Teaching and Learning with LUDII

Matthew Stephenson, Eric Piette and Cameron Browne

LUDII is an upcoming digital system that aims to provide a generic implementation for describing a large assortment of traditional games across many different cultures and time periods. This system provides a great opportunity to educate people about game design principles and AI techniques. One example could be as an interactive tool for exercises in lectures, where students must identify suitable rule sets for a game given only a description of the board and pieces. These rules must present a game that is balanced, strategically deep and easy to learn for new players.

The LUDII system will also allow for a greater understanding of the lineage of these traditional games and the mathematical concepts that they embody. Analyzing similar design principles between games over a long period of history allows us to model and understand the transmission of ideas across time, place and culture. Using this historical data to construct family trees that demonstrate the phylogenetic relations between games allows us to identify missing links between games that have not yet been discovered, as well as feasible game reconstructions from incomplete information (e.g. Senet).

Matthew Stephenson is a Postdoctoral Research Assistant at Maastricht University's Department of Data Science and Knowledge Engineering (DKE), working on the Digital Ludeme Project. Matthew currently has a pending PhD degree from the Research School of Computer Science of the Australian National University (ANU). Matthew received a BSc (Hons) in Computer Science from the University of Canterbury (UC). His primary research is focused around various topics in AI for games, including general game AI, procedural content generation, agent development, computational complexity analysis and deceptive game design.

Eric Piette is a Postdoctoral Research Assistant at Maastricht University's Department of Data Science and Knowledge Engineering (DKE). In his doctoral thesis defended at the University of Artois in 2016, Eric paved the way for a new approach for combining Monte Carlo methods and a Stochastic Constraint-based Approach to General Game Playing, winning the AI 2017 Thesis award of the AFIA and the 2016 General Game Playing competition organised by Stanford University. His last paper published in IJCAI-2017, which established a tight relationship between symmetry detection in Constraint Satisfaction Problems and transposition detection in GGP, was selected as one of three finalists for the distinguished paper award out of 2,540 submitted papers. Eric is an active member of the French working group for Game AI.

Cameron Browne is an Associate Professor at Maastricht University's Department of Data Science and Knowledge Engineering (DKE), where he is running the €2m ERC-funded Digital Ludeme Project over the next five years. Cameron received his PhD degree from the Queensland University of Technology (QUT) in 2009, winning a Dean's Award for Outstanding Thesis and producing the world's first published computer-generated games. He is the author of the books *Hex Strategy*, *Connection Games* and *Evolutionary Game Design*, which won the 2012 GECCO "Humies" award for human-competitive results in evolutionary computation. He is a Section Editor of the *IEEE Transactions on Games* and the *International Computer Games Association (ICGA) Journal*, and is the founder and Editor-in-Chief of the *Game & Puzzle Design* journal.